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CONCEPTUAL FRAMEWORK FOR UNDERSTANDING IMPACT OF PROFESSIONAL TEACHERS' IDENTITY FORMATION ON USAGE OF DIGITAL LEARNING MATERIALS

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CONCEPTUAL FRAMEWORK FOR UNDERSTANDING IMPACT OF PROFESSIONAL TEACHERS' IDENTITY FOR- MATION ON USAGE OF DIGITAL LEARNING MATERIALS

Research in Progress

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Abstract

Recently the results of a study examining the current state of digitized learning among different educational sectors in Germany revealed that students of teaching education are despite the availability of good technological infrastructure the least motivated group of students to use digital learning materials (DLMs). As students of teaching education are often regarded as the key factor of the educational digitization in schools, the question arises, "What motivates students' of teaching education to integrate Information and Communication Technologies (ICTs) in their daily pedagogical practices?". To answer this question, we elaborate on the theory of Professional Identity Formation, while considering a teachers' professional identity as a process in which different attributes, beliefs, values, motives, and experiences, the terms by which students define themselves in a professional role, are evaluated and internalized. Based on this a research model is proposed that combines the process of identity formation and the Context Input Process Product model, an evaluation model designed to achieve and improve accountability of educational programs. We intend to measure the influence of five selected variables: students' motives to attend teacher education, faculty support, preparation for the teaching profession, professional orientation and commitment and their impact on students' intentions to use DLMs.

Keywords: Digital Learning Materials, Students of Teaching Education, Professional Identity Formation.

1 Introduction

Hardly a day goes by at which digital transformation at schools is not a topic of interest in media. Today, children and teenagers grow up naturally with digital media and master its usage effortlessly. This is also supported by the fact that children are going online at ever younger ages, in several Northern European countries at the age of eight, in Denmark and Sweden already at the average age of seven (Livingstone et al., 2011). However, although having this digital background children attend higher education systems without any proper opportunity to benefit from the asset they bring with them. Successful usage of ICTs for learning during lessons requires a particular level of teachers' confidence in their own ICT competences. However, most teachers, although familiar with ICT for teaching and learning for some years, still use it first and foremost to prepare for their teaching than to use it to work with students during lessons (Survey of Schools, 2013). The recent results of a wide European study confirm that while 70% of teachers recognise the importance of digitally supported methods, only 20% of students are taught by digitally confident teachers (Survey of Schools, 2013).

To enable the digitization of schools as well as provide sufficient digital trainings for teachers, the German government recently induced several financial measures. Therefore, by 2025, more than ten per cent of the German gross domestic product (GDP) should flow into education and research (Schmoll, 2017). Given this background the Bertelsmann Foundation, a German independent foundation under private law, published a study entitled Monitor Digital Education (*Monitor Digitale Bildung*), examining the current state of digitized learning among different educational sectors in Germany (Schmid et al., 2017). The results of this study reveal an important paradox. On the one hand, the majority of universities in Germany are technically well equipped (Schmid et al., 2017). More precisely the results reveal that eighty per cent of the teachers are satisfied with the appropriate equipment and the quality of Wi-Fi connection at their universities (Schmid et al., 2017). The information technology (IT) equipment gets even better grades from the students and considering the usage of digital media within classrooms; ninety per cent is equipped with digital media (Schmid et al., 2017). Despite the didactic potential of digital media, the good infrastructure remains often unexploited. On the other hand the results show that while most educators do use more established technologies such as PowerPoint for presentations and learning management systems for distributing teaching materials, especially students are those who are more likely to use newer digital learning tools (Schmid et al., 2017). This is important and gratifying, as teachers as well as students of teaching education are often regarded as the main *drivers* of the educational digitization. The following rule applies: if one is interested in the topic of digitization anyway, one also teaches it, if one is however not affine, one teaches it less.

Less gratifying is, that according to further results of the Bertelsmann foundation study education students show a rather large distance to the usage of digital media during their time at university (Schmid et al., 2017). Even worse, the results reveal that students of teaching education are in particular the least motivated group to use digital learning media (Schmid et al., 2017). This is reflected in the comparatively low usage of digital media in their studies: thus teaching students use on average less digital media than students of other subjects (Schmid et al., 2017). Numerous authors have examined factors determining teachers' use of Information and Communication Technologies (ICTs) (Mumtaz, 2000; Drent and Meelissen, 2008; Buabeng-Andoh, 2012; Vrasidas, 2015). However, so far the focus relied on isolated teacher related variables to explain the weak level of ICT integration (Sang et al., 2010) and less on variables related to the teachers' education history. However, the latest research in this field indicates that learning to be a teacher is as important as learning how to teach (Chong, 2011; Chong et al., 2011; Kelchtermans and Hamilton, 2004; Meijer et al. 2011; Schepens et al. 2009; Friesen and Besley, 2013) and that one of the important components of teaching education is the development of a professional teachers identity (Friesen and Besley, 2013).

Hence within this research paper we intend to answer the following research question:

RQ: What determines the intentions of students' of teaching education to use digital learning media (DLM) within classrooms for their future teacher career?

In this study, we aim to reveal factors that facilitate or inhibit these intentions. An appropriate identification of these factors can facilitate appropriate measures that may enhance students of teaching education motivation towards DLM usage. Based on the theory of teachers' professional identity formation we aim to observe factors related to professional identity formation and their influence on students' of teaching intentions to use DLMs in the future. A teacher's identity is usually defined as a continuous process of negotiating between one's personal self with one's professional self when becoming a teacher (Beijaard et al., 2004). Students of teaching education therefore negotiate their student identities, reflecting their identification with the student status as well as the learning approaches they follow, with the perceptions of their (future) teachers' identities. Becoming a teacher doesn't represent only the beginning of a new profession; rather it is the result of complex dialogic processes and on-going negotiation of current tensions with previous experiences (Britzman, 2003; Bullough, 2005). To these experiences necessarily also belong the students' experiences with DLMs within their studies, their perceptions of DLMs as well as the use of DLMs by their educators. Thus, illuminating the intertwinement of IT, in this case, DLMs and (future) teachers' identities is important for understanding individuals' behaviour in the roles they occupy in the groups with which they affiliate (Carter et al. 2017) and their future actions.

In educational environment digital learning media cover a wide range of learning tools including not only the latest technologies such as tablets, smartphones or whiteboards, but also new application programs for example word processing, online learning programs for different school subjects and online learning platforms. These offer simple explanations, courses, tutorials, exercises and sample solutions in mathematics (e.g. Serlo; www.serlo.org) or provide relevant learning materials from the field of geography in an interactive form (e.g. Webgeo; www.webgeo.de). All of these innovations hold great potential in the educational environment for designing new teaching and learning processes. They enable the realization of high-quality learning arrangements that can be tailored to the individual target groups. Their biggest advantage is that they are available regardless of time and space, allowing for quick adaptation of content to current developments and requirements in the educational sector. Hence in this study, digital learning must be understood in its broad sense, covering all learning processes in which stationary computers or mobile devices are used. This definition includes a wide range of digital learning processes, from the mere support of presence learning through digital videos to self-directed learning within a learning environment (e.g. learning management systems) (Schmid et al., 2017). Consequently DLMs should be understood as learning tools that include video clips (e.g. a YouTube fragment), simulations (e.g. simulation of an electronic circuit), illustrations (e.g. photos and drawings) and computerized tests (Kreijns et al., 2012).

The remainder of this paper is structured as follows: the next section 2.1 presents and elaborates on the formation of professional identity among students of teaching education. In subsection 2.2 we present the CIPP model, an evaluation model that requires the evaluation of context, input, process and product in judging a programme's value, however for the purpose of this study the model is used to measure students' professional identity. Section 3 discusses our research approach. In Section 4, the expected contributions are discussed in detail.

2 Theoretical Framework

2.1 Teachers' Identity Formation

According to Beijaard et al. (2004) recent research on teachers' professional identity relates to studies that focuses on teachers' professional identity formation, identification of characteristics of teachers' professional identity and studies in which professional identity is represented by the teachers' stories (Beijaard et al., 2004). Professional identity generally refers to "the constellation of attributes, beliefs, values, motives, and experiences in terms of which people define themselves in a professional role" (Ibarra, 1999, pp. 764-765). Beijaard et al. (2003) highlight four essential features of teachers' professional identity.

The first one considers professional identity as an on-going process of interpretation and re-interpretation of experiences (Kerby, 1991), which correlates with the idea, that the process of identity formation is never-ending and lifelong. In the context of student teachers, the professional identity formation answers beside the question *who I am at the moment* also the question *who do I want to be later* (Beijaard et al., 2003). The on-going process of identity formation is therefore dynamic, and neither stable nor fixed (Beijaard et al., 2003). This dynamic sense of identity can be also termed as (student) teachers' self-understanding (Kelchtermans, 2004). Naturally, many knowledge sources are involved in this formation process (Surgue, 1997): the students' personality, their family or significant others, their teaching practice experiences, atypical teaching episodes, the policy context and teaching traditions and culture, tacitly acquired understandings and not less importantly the intertwinement with IT.

Secondly, professional identity implies both person and context (Beijaard et al., 2003). The teaching profession is generally associated with some characteristics to which students, based on their perceptions, add values differently. The process of identity formation is thus exposed to external influences that are perceived, evaluated and internalized by the students and become so part of their own identities. Some of these external influences may be represented by early childhood experiences, teacher role models, family or significant others (Knowlesm 1992; Sugrue, 1997). Thus, if students positively value the characteristics of their teachers - they will probably try to implement these later on in their own teacher profession. In terms of ICT use, this situation would involve a tech-savvy teacher who uses digital media in the classroom in order to convey the knowledge to the students. Students of teaching education evaluate what they see and draw a conclusion whether they apply or not the same behaviour to their own professional identity.

Third, teachers' professional identity consists of sub-identities relating teachers' different relationships and contexts (Beijaard et al., 2003): the teacher as a subject matter expert, pedagogical expert, and didactical expert (Beijaard et al. 2000). The first sub-identity relates to the fact, that traditionally, knowledge of a particular subject matter is a relevant part of a teacher's professional knowledge base (Beijaard et al. 2000). The second sub-identity relates to the fact that moral and ethical dimensions are more present in teaching than in many other professions (cf. Fenstermacher, 1994). Beijaard et al. also argue that teaching cannot be reduced only to a technical or instrumental action that results in learning gains with students (Beijaard et al. 2000). The didactical side of the teaching profession must be related to a pedagogical side accompanied by ethical and moral features (Beijaard et al. 2000). Hence being a digital expert, who through models of teaching explicitly learn to consider relevant aspect of teaching constitutes teacher's third sub-identity of professional identity (Beijaard et al. 2000). For a teacher it is essential that these sub-identities do not contradict each other (Beijaard et al., 2003). These identities, too, are assigned unstable values, which determine whether the identities are maintained, left or further developed. The more central a sub-identity is, the more costly it is to change or lose that identity (Beijaard et al., 2003). These sub-identities can conflict with one another during teacher education as well as during teaching practice often termed as the theory practice gap or practice shock (Kelchtermans and Ballet, 2002; Volkmann and Anderson, 1998).

The last feature, agency, represents an element that causes teachers to be active in the process of their professional development (Coldron and Smith, 1999; Beijaard et al., 2003). As already mentioned, students of teaching education are expected to develop in accordance with certain societal expectations. Within this development process a crucial role is played by the context in which this evolution takes place. However, the students of teaching education do not simply adopt these standards or competences exactly as they are described or prescribed in terms of knowledge, skills, and attitudes (Schepens et al. 2009). This means that students' of teaching education differ in how they deal with these expectations depending on the value they personally attach to them and how they relate to other people (Schepens et al., 2009).

As personal and professional aspects of becoming and being a teacher are continuously evaluated and internalized, a teachers' identity formation represents an on-going process. An important role within the identity formation process can be ascribed to teachers, who act for students of teaching education

as role models. Although, there is a wide agreement concerning the role of teacher education in identity formation, until now only little empirical evidence has been collected to support this assumption (Schepens et al., 2009). However, research on teachers' professional identity formation is of relevance for teacher educators in order to get a better understanding of how they should support student teachers to become and understand themselves as teachers (Korthagen, 2004; Tigchelaar and Korthagen, 2004). As a teacher's professional identity is important in the sense that it is believed to strongly determine how a teacher teaches, how they develop professionally, and how they approach educational changes (Nias, 1989) it is important to understand how the teacher education process can contribute to the development of teachers' professional identity (Beijaard et al., 2004; Korthagen, 2004).

2.2 Context Input Process Product model

Following the approach presented by Schepens et al. (2009) for the purpose of our study we aim to apply the Context Input Process Product (CIPP) evaluation model (i.e., Context, Input, Process and Product) of Stufflebeam and Guba (Stufflebeam, 1972; Stufflebeam, 2000; Galuzzo and Craig, 1990). The CIPP model is a theoretical framework, which has been employed to evaluate the effectiveness of teacher education programmes (Schepens et al., 2009). In the CIPP model, the type of evaluation strategy (context, input, process or product) to be carried out is dependent upon the type of decision situation in which the evaluators and decision-makers are involved (Hinkle, 1973). However, recently the CIPP model was also used as a frame of reference to organize the variables involved in the professional identity formation, here the teachers' identity formation by Schepens et al. (2009) in order to examine the interrelationship between the education of the future teacher and professional identity formation (Kraiger et al., 2014).

In this study the student teachers' professional identity formation process is represented by making use of context, input, process and product variables reflected in the CIPP model (Schepens et al., 2009). The input, process and product variables respectively represent the student teachers' personal identity before entering teacher education, the influences during teacher education, and the result of the professional identity formation (Schepens et al., 2009). The input variables of the CIPP are represented by the students' motives to attend teacher education at the moment of entering teacher education (Schepens et al., 2009). The process variables are determined by the faculty support and cooperating teacher support as well as how well student teachers feel they are being prepared for the teaching profession (Schepens et al., 2009). The product variables are student teachers' professional orientation and their commitment to teaching (Schepens et al., 2009). Hence, the formation of students' of teaching professional identity is an on-going process that can be measured by input, process and product variables as stated in the chapter above. To observe the influence of these factors, we propose, that students' intention to use DLMS as a future teacher is an outcome, a specific behaviour, which is a result of the professional identity formation process. Hence, in order to test which factors (input, process, product) do affect students' intention to use DLMS, when it comes to the observation of students' of teaching education professional identity formation, we formulate the following hypotheses.

Firstly, we elaborate on the input variable of identity formation, namely *students' motives to attend teacher education*. A study provided by Jungert et al. (2014) explores motives for students to attend teachers' education and become teachers. Based on a confirmatory analysis, three motivational factors, altruistic, intrinsic and extrinsic motives were examined. The results revealed that a negative, significant relationship between the altruistic motive and students' dropout of school (dropout rate) exists and that this relationship is mediated by academic engagement. On the other hand, the relationship between intrinsic and extrinsic motives and academic engagement was not found to be significant (Jungert et al., 2014). Generally intrinsic motivation refers to behaviour that is driven by internal rewards. In the context of our study, the motivation to attend teachers' education would therefore arise from within the individual because it is naturally satisfying to him/her. This perception would contrast with extrinsic motivation, which implicates engaging in a behaviour in order to earn external rewards or avoid punishment. We argue, that intrinsic motives to attend teachers' education are related to one's willingness to use education related tools such as DLMS.

H1: Students' motives to attend teacher education have a positive impact on students' intention to use DLMS.

As described above the students' professional identity formation is an on-going process determined by students previous learning experiences, interactions with teachers and important others. Hence, when considering the two process variables of professional identity formation process, *students' preparation for teaching profession* and *students' perceived faculty support*, when it comes to DLMS use students evaluate and internalise the past behaviour they observed and where exposed to. This in turn influences their future intentions to use DLMS in their future teacher career.

H2: Students' preparation for the teaching profession has a positive impact on students' intention to use DLMS.

We hence expect that the extent to which students' of teaching education perceive the faculty as supportive when it comes to DLMS use, this support will also have a positive impact on their preparation for teaching profession.

H3: Students' perceived faculty support has a positive impact on students' preparation for teaching profession.

Despite the lack of literature on the relationship between commitment to teaching and predicting technology use among teachers, according to Vannatta and Fordham (2004) in several teacher technology programs could be observed, that the teachers who committed time to interact with technology and who were interested in learning despite external rewards were the ones who made the greatest gains in technology use. Generally commitment to teaching is defined as a teacher's degree of psychological attachment to the teaching profession (Coladarci, 1992). More precisely, it describes the degree to which a person is dedicated to, cares about and is proud to be a member of a given profession, here teachers (Wallace, 1995). Is this feeling of commitment present, when it comes to usage of DLMS, then future teachers intentions to use DLMS are positively affected, as they are already in their nature designed to facilitate ones' possibilities to express ones ideas. As a result, professional commitment effects then not only a person-technology fit but also its subjective outcome (Speier and Venkatesh, 2002). Hence the following hypothesis 4 is formulated:

H4: Students' Commitment to teaching has a positive impact on students' intention to use DLMS.

Professional orientation is defined as an individual's fundamental motives for conducting a specific task or job while reflecting the degree of alignment or fit between an individual's values and the values projected by the organization (Jans and Frazer-Jans, 2009). Previous research confirms that an individual with a high professional orientation is usually one who primarily identifies with their professional group, is committed to developing and retaining the power and prestige of the particular profession while developing the abstract knowledge system and looking to professional colleagues for support - both within and outside the organization (Miller & Wager, 1971; Abbott, 1988). To some extent professional orientation represents a teacher's autonomy within the classroom. Hence, when it comes to the usage of DLMS we argue, that an individual who has a strong professional orientation and therefore intends to perform a high level of autonomy within the classroom will also intend to use DLMS.

H5: Students' Professional Orientation has a positive impact on students' intention to use DLMS.

Finally, we propose our conceptual model as illustrated in the following Figure 1:

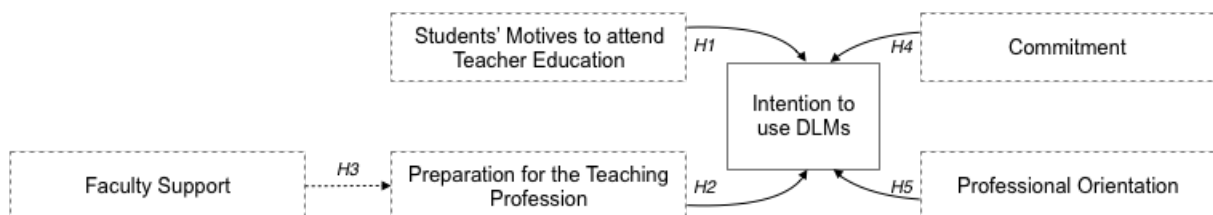


Figure 1: Proposed Research Model

3 Research Approach

To empirically validate our model we constructed a standardized questionnaire (Table 1) both in paper and online format, in order to prevent a preliminary selection of online audience. Due to availability of current instruments measuring the ascribed variables we rejected a qualitative study. The paper form questionnaire will be distributed among students of teaching education as well as online students' groups via social networks; the target group are students of teaching education. We have already initiated contact with several educators and conducted a pre-test to test our questionnaire for clarity. The survey takes about 15 minutes and is completely anonymous. We intend to have the results at the end of the first quarter of 2018. In order to motivate students to participate in our survey they will be given the possibility to register their email in order to a) obtain the result of the survey and/or b) enter a draw and win one of five vouchers to the value of twenty euros for selected online book stores. The first section of the questionnaire will contain a brief description of the terms Digital Learning and Digital Learning Media as presented in section 1 of this paper. In the following, questions referring to the factors considering the input variable, process variables and product variables will be asked. The last tested variable is *students' intention to use DLMS in the future*. Additionally questions related to demographics will be examined. Data analysis is planned with the partial least squares approach to structural equation modelling (PLS-SEM) in order to assess how well the latent constructs were measured and to estimate their relationships (Chin, 1998). For this analysis the software SmartPLS will be used to determine path influences. To test their significance, we intend to use the bootstrapping procedure incorporated in SmartPLS.

Construct	Items	Source
Input Variables	Students' Motives to attend teacher education	Following Schepens et al. 2009
	To become a teacher: <i>Scale: Strongly disagree – Strongly Agree</i>	
	I started teacher education to become a teacher.	
	I started teacher education to have a teaching job.	
	Educational Interest: <i>Scale: Strongly disagree – Strongly Agree</i>	
	I started teacher education because of my educational interest.	
Process Variables	I started teacher education to learn more about some subject domains.	
	Faculty Support	
	When it comes to the use of digital learning media (DLM), most teacher educators from the institution... <i>Scale: Strongly disagree – Strongly Agree</i>	
	1. recognize good performances of their students.	
	2. draw attention to important educational concepts.	
	3. are approachable.	
	4. are receptive to different points of view.	
	5. are good role models for students.	
	6. have realistic expectations toward students.	
	7. explain subject matter that is not well understood.	
	8. express trust in students.	
	Preparation for the teaching profession	
	When it comes to the use of digital learning media (DLM), to what extent did teacher education prepare you for: <i>Scale: Prepared very well – not at all</i>	
	1. determining the beginning situation of pupils.	
Product Variables	Professional orientation	
	When it comes to the use of digital learning media (DLM) <i>Scale: Strongly disagree – Strongly Agree</i>	
	1. Cooperating across subject domains needs to be part of the teaching job.	
	2. Which instructional techniques to use should be decided on school level with other teachers.	
	3. It is important that teachers talk to each other about their teaching style.	
	4. Decisions regarding the pedagogical classroom climate should be made on school level with other teachers	
	5. The subject matter content to offer to pupils should be decided on school level with other teachers.	
	Commitment	
	When it comes to the use of digital learning media (DLM) <i>Scale: Strongly disagree – Strongly Agree</i>	
	1. As a teacher one can express ones qualities.	
Intention to use DLMS	2. The teaching job keeps you mentally in motion.	Following Fishbein and Ajzen, 2011
	3. As a teacher one can express all his or her ideas.	
	4. Working as a teachers is very satisfactory.	
	As a future teacher: <i>Scale: Absolutely likely – Absolutely Unlikely</i>	
	1. I plan to use digital learning materials during class regularly.	
	2. I intend to use digital learning materials during class regularly.	
	3. I think I should use digital learning materials during class regularly.	

Table 1: List of intended measurement items incl. sources. (7 point-scale)

4 Discussion and Expected Contributions

The starting point for the presented research in progress paper were the findings from the study entitled Monitor Digital Education (*Monitor Digitale Bildung*), published by a German independent foundation examining the current state of digitized learning among different educational sectors in Germany (Schmid et al., 2017). The results of this study revealed an important paradox. While on the one hand, the majority of universities in Germany is technically well equipped (Schmid et al., 2017) the didactic potential, remains often unused. Especially students of teaching education show a rather large distance to usage of digital media during their education (Schmid et al., 2017). Even worse, the results reveal that students of teaching education are in particular least motivated to use digital learning media (Schmid et al., 2017). This is reflected in the comparatively low use of digital media in their studies: teaching students use on average less digital media than students of other subjects (Schmid et al., 2017). Hence, teaching students in particular are not enthusiastic at all, when it comes to the topic of digitalization (Schmid et al., 2017). However, university administrators and administrative staff rely on teachers and students as the key drivers for the digitization of teaching. For teachers, everything depends on their own initiative: those who are interested in the use of digital learning materials will apply them also to their teaching style; however, those who are not tech-affine will also teach less digitally. Students of teaching education prove to be less digitally affine. They use digital media the least compared to other student groups and show also the least motivation to do so (Schmid et al., 2017).

Thus, the question arises why especially students of teaching education have such low motivation to use digital media. To answer this question, this study examines the concept of teachers' professional identity formation and its relation to students' intention to use DLMs in the future. Generally, the concept of identity formation describes an active process in which the individual evaluates and internalizes all events, experiences and attitudes, then attributes these experiences values, which he/or she in turn internalized (or not). These experiences and external influences necessarily involve among others also the students' contact with digital learning materials. These can be used either by their teachers or professors, their circle of friends or fellow students or by himself. Thus, they unavoidably influence their future use in the teaching profession. In order to better conceptualize and understand the process of identity formation, the present study uses the CIPP model, which despite its evaluative nature is well suitable to measure teacher professional identity formation processes (Schepens et al., 2009).

With our work we contribute to the IS literature in multiple ways: First, we contribute to research on digital learning material usage by providing a more nuanced understanding of perceptions that lead especially students of teaching education to actively use these tools in their future career. Second, we uniquely observe the model of teachers' identity formation in the context of digital learning media usage. Here three group of variables: input, process and product variables of the CIPP model are observed in relation to students' intention to use DLMs in the future within the teaching profession. Third, we provide indications, that students' identity formation process is related to students' perceptions, experiences and influences by others when it comes to the usage of DLMs. To the best of our knowledge, this is the first time such work has been intended to be done. The practical contribution of this study may be seen in the implementation of the research findings when designing study programs for students of teaching education as well as drawing the attention of the faculty support to innovative educational concepts considering the formation of teachers' professional identity.

In understanding these implications, our research raises awareness for the fact that students of teaching education constitute a specific group of students, that is heterogeneous when it comes to the level of teachers' professional identity formation and that this heterogeneity must be considered when examining the interactions with DLMs. Finally, we expect that our research can not only theoretically contribute to the list of factors that have to be considered when examining students' teacher professional identity formation and students' intention to use DLM, but will also practically facilitate the interaction and intertwinement of education students with these technologies.

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